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WLDG 180.01: SMAW and Oxyacetylene Welding

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**THE UNIVERSITY OF MONTANA
COLLEGE OF TECHNOLOGY
INDUSTRIAL TECHNOLOGY DEPARTMENT**

COURSE SYLLABUS

COURSE NUMBER AND TITLE: WLDG 180 SMAW and Oxyacetylene Welding

DATE REVISED: August 2018

SEMESTER CREDITS: 4

PREREQUISITES: None

Instructor: Zachary Reddig

E-Mail: Zachary.reddig@umontana.edu

(According to new Federal and UM policies I cannot answer any email that does not come from an official UM email address; no Hotmail, AOL, yahoo, gmail, etc.)

Phone: 243-7644

Office: Welding Lab Office

Office Hours: By appointment or as posted on Faculty office door

RELATIONSHIP TO PROGRAM(S):

This course covers the theory of operations and skill development with a process that is primary in the welding of iron and steel. This experience complements the other welding processes taught in the program to attain a solid, broad based understanding of welding as an industrial metals joining process.

COURSE DESCRIPTION:

Theory and safe operation of shielded metal arc welding (SMAW) of carbon steel on plate and structural components in all positions to industry standards. Visual inspection and destructive testing used to determine acceptability based upon industry standards (American Welding Society Structural Welding Code-Steel). Power sources and electrodes are covered in depth. Materials are prepared using mechanical plate shears and thermal cutting techniques. Thermal cutting techniques are examined relative to theory of operation and safe practices. Processes used are oxy-fuel cutting, plasma arc cutting, and air carbon arc cutting. Theory and operation of oxyacetylene welding examined. All students will be able to obtain a NCCER Welding Level I certificate with full completion written tests and practical test. All practical tests are provided as a checkoff in the fall semester 2018 rotation schedule.

STUDENT PERFORMANCE OUTCOMES:

Occupational Performance Objectives

Upon completion of this course, the student will be able to:

1. Demonstrate by written exam, the theory and safe operation of SMAW equipment.
2. Demonstrate by written exam the theory and safe operation of Oxy-Fuel Cutting (OAC), Plasma Arc Cutting (PAC) and Air Carbon Arc Cutting (AAC).
3. Demonstrate by practical exam, evaluated to AWS Structural Welding Code-Steel (AWS D1.1) standards, skill in the use of SMAW equipment and materials.
4. Demonstrate by practical exam, evaluated to AWS Structural Welding Code-Steel (AWS D1.1) standards, skill in the use of OAC, PAC, AAC equipment and materials.

5. Demonstrate by practical exam, evaluated to industry standards, skill in the use of OAW equipment and materials.

STUDENT PERFORMANCE ASSESSMENT METHODS AND GRADING PROCEDURES:

Grading Scale:

A= 100%- 90%

B= 89%- 80%

C= 79%- 70%

D= 69%- 60%

F= 59%- 0%

NOTE: Courses must be passed with a 'C minus (C-)' or greater to count toward degree/certificate requirements.

Grading Breakdown:

Lab Work	40%
Exams	30%
Quizzes	10%
Notebook	05%
Professionalism	15%

Practical Welding Tests: Hands-on welding tests based on lab assignments. Upon successful completion of lab assignments a hands on welding test derived from written specifications and graphics (drawings) will be administered. It will be graded based upon execution ie. fit-up, weld profile, workmanship, etc. as prescribed by AWS standards and the instructions given at the time of the test.

Written Exams: Exams based on class lectures, reading assignments given in class, homework, notes from class video presentations, etc. **No make-up exams will be allowed.**

Quizzes: Short impromptu tests given on reading assignments, demonstrations, lectures. Composed of student name/date and three questions. Name and date are worth 25%. Each question is worth 25%. To receive credit for questions the question must be written out and answered correctly. Quizzes may be given at anytime during the course scheduled meeting time. **No make-up quizzes will be allowed.**

Notebook: Compilation of class notes and handouts. To receive the full 5% credit, the notebook must be neat and organized. It must also be contained or be found contiguous within a three ring binder.

Professionalism: Defined as a combination of attitude, motivation, participation, organization and work area cleanliness as demonstrated on a daily basis in the lab and classroom. There is mandatory class attendance expected in this class, such as place of employment. There are circumstances beyond your control but communication is needed. If you cannot make class contact is expected from the student by email or phone call. Letting a cohort know that you cannot make it to class doesn't count.

POLICIES:

- **Safety is required to be practiced at all times. Disregarding safety practices, endangering yourself or others may result in your being denied access to the lab**

areas.

- Eye protection is mandatory at all times in the lab area.
- Noise cancelling headphones and earbuds are forbidden to be used in the lab shop area. This also goes for music, the shop is loud enough. If ear protection is needed they need to be ANSI safety rated earplugs. These can be provided or you can have your own.
- “Make up” exams or quizzes are not given for any reason
- Assignments will be docked 10% for each day it is turned in late after the due date.
- Cell phones are to be turned off during class time: no texting, calculations, or calls are to be done during class time.
- Any forms of cheating during exams or quizzes are an automatic 0.
- Students are expected and required to learn how access and navigate Moodle by the end of first week of instruction. These function as supplements to the course.
- Attendance is taken, you are required to be in attendance to successfully complete the course.

REQUIRED TEXTBOOKS:

Welding Principles and Practices 4th Ed.; Bohnart, McGraw Hill.

Supplementary text provided- NCCER Welding Level I (Trainee Guide)

SUGGESTED REFERENCE MATERIALS:

The Welding Journal, published monthly by the American Welding Society

REQUIRED SUPPLIES:

1. Welding Helmet with #10 or #11 lens
2. Welding Gloves
3. Eye Protection
4. Pliers with wire-cutting capabilities
5. Wire hand brush
6. 4” or 4 1/2” right angle handheld grinder
7. Upper body protection, leathers, coveralls or equivalent
8. Lock for locker

ACADEMIC INTEGRITY: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at <http://www.umt.edu/SA/VP/SA/index.cfm/page/1321>.

DISABILITY ACCOMMODATION: Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please contact me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disability Services website at <http://www.umt.edu/dss/> or call 406.243.2243 (Voice/Text).

COURSE OUTLINE:

- 1.0 Industrial Safety
 - 1.1 Electrical safety
 - 1.2 Dangers from arc radiation
 - 1.3 Burn treatment
 - 1.4 Dangers from general industrial machinery

- 2.0 SMAW equipment and consumables
 - 2.1 Theory of Shielded Metal Arc Welding (SMAW)
 - 2.2 SMAW equipment
 - 2.3 SMAW consumables
- 3.0 OAC equipment and consumables
 - 3.1 Theory of Oxy-Acetylene Cutting (OAC)
 - 3.2 OAC equipment
 - 3.3 OAC consumables
- 4.0 PAC equipment and consumables
 - 4.1 Theory of Plasma Arc Cutting (PAC)
 - 4.2 PAC equipment
 - 4.3 PAC consumables
- 5.0 AAC equipment and consumables
 - 5.1 Theory of Air Carbon Arc Cutting (AAC)
 - 5.2 AAC equipment
 - 5.3 AAC consumables
- 6.0 OAW equipment and consumables
 - 6.1 Theory of Oxy-Acetylene Welding (OAW)
 - 6.2 OAW equipment
 - 6.3 OAW consumables
- 7.0 Practical Arc welding-skill development
 - 7.1 SMAW - general electrodes, E-6013, E-7014, E-7024
 - 7.2 SMAW - E-6010
 - 7.2.1 Fillets and groove welds in all positions, plate and structural
 - 7.3 SMAW - E-7018
 - 7.3.1 Fillets and groove welds in all positions, plate and structural
- 8.0 Practical cutting - skill development
 - 8.1 OAC
 - 8.2 PAC
 - 8.3 AAC
- 9.0 Practical Gas welding - skill development
 - 9.1 OA welding in the flat and vertical positions - mild steel
 - 9.2 OA brazing and soldering

NOTE: Faculty reserves the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances.